Remarks

The Applicants respectfully request reconsideration of the application in view of the foregoing amendments and the following remarks. Claims 67-132 are pending. Claims 1-66 have been canceled without prejudice. In the Office action, the Examiner rejects claims 67-132 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,933,451 to Ozkan et al. ("Ozkan patent") in view of U.S. Patent No. 6,459,811 to Hurst ("Hurst patent") and, for some claims, other U.S. Patent references. The Applicants respectfully disagree with the rejections.

I.   Summary.

In the Amendment filed April 26, 2007, the Applicants added "given video clip" language to the claims and pointed out that the Ozkan patent does not teach or suggest the use of "multiple sets of reference decoder parameters" for the same, given video clip. Even if the Ozkan patent describes multiple sets of parameters for multiple different channels (with one set of parameters per channel), this is different than having multiple sets of parameters for a single video clip.

In the Office action, the Examiner maps the "video clip" language of the claims to a group of pictures ("GOP") in the Ozkan patent. Office action, pages 3-4. In particular, the Examiner cites parts of the Ozkan patent describing adjustment of a rate parameter from GOP to GOP. Even if, for the sake of argument, a GOP is an example of a "video clip," the Ozkan patent, taken separately or in combination with the Hurst patent, still does not teach or suggest multiple sets of parameters for a given video clip. Below, the Applicants reiterate reasons why the Ozkan patent, taken separately or in combination with the Hurst patent, fails to teach or suggest the "multiple sets of reference decoder parameters" language and other language of the claims. In addition, the Applicants have made editorial revisions to the claims to make the following point more explicit. The claims are directed to uses of "multiple sets of reference decoder parameters" as *different, alternative sets of parameters for the same video images*:

> "each of the multiple sets indicates a different and alternative combination of rate parameter and decoder buffer size parameter for the same video images in the given bit stream of encoded data for the given video clip" (claims 67, 92, 117, 128 and 132); and

"each of the multiple sets represents a different and alternative point along a rate-decoder buffer size curve for the same video images in the given bit stream of encoded data for the given video clip" (claims 108 and 121).

The application as filed supports these amendments at, for example, pages 3-5, 14-16 and 20-25. Changing a rate parameter from period to period (e.g., GOP to GOP) for a video channel (as in the Ozkan patent) and changing a rate parameter from channel to channel (as in the Ozkan patent) involve changing rate parameter between different video pictures. Even if, for the sake of argument, this results in different "sets of parameters" for the different video images, it leads away from different, alternative sets of parameters signaled for the same video images.

II.   The Ozkan Patent.

In the interest of reaching a shared understanding of the disclosure of the Ozkan patent, the Applicants make the following observations.

In the Ozkan patent, a multiplexer system (*see* Figure 1) includes input terminals 5 for different channels of video, and each of the input terminals 5 is coupled to a channel processor 10. Ozkan patent, 2:57-3:6, Figure 1. The system also includes a bit rate allocator 30.

As shown in Figures 1 and 2, each processor 10 includes a complexity output (coupled to a complexity input of the bit rate allocator 30) and a control input (coupled to a "quota" control output of the bit rate allocator 30). Ozkan patent, 3:14-21, Figure 2. Each processor 10 also includes a complexity analyzer 16. The output of the complexity analyzer 16 (as the output of the processor 10) is the corresponding input of the bit rate allocator 30. Ozkan patent, 3:48-62, Figure 2. Each processor 10 includes a constant bit rate encoder 14. The control input of the processor 10 is input to the encoder 14. Ozkan patent, 3:48-62, Figure 2. Each encoder 14 encodes video for a given period such as 12 pictures, which can be a group of pictures ("GOP"), at a bit rate determined by the signal at its control input. Ozkan patent, 3:48-62, 4:63-5:8.

The bit rate allocator 30 receives complexity inputs from the respective complexity analyzers 16 of processors 10 for different channels. Ozkan patent, 3:48-62, 5:63-6:29. Using the complexity inputs, a component of the bit rate allocator 30 "determines the quota of bits for the next quota period for each of the encoders, and supplies signals representing those quotas to the plurality 10 of channel processors via the QUOTA output terminals at the next quota period." Ozkan patent, 6:26-29; *see also* 4:63-5:8. The bit rate allocator 30 thus produces quota control

outputs to the respective encoders 14 of processors 10 for different channels. Ozkan patent, 3:48-62, 5:63-6:29.

Much of the Ozkan patent is devoted to describing encoder-side decisions concerning how to allocate bits from period to period across different video channels. *See, e.g.*, Ozkan patent, 3:22-46, 8:63-9:36. R^i indicates the number of bits allocated to a video channel i over a quota period. *Id.* When a video channel has more complex content, relatively more bits are allocated to that video channel, with fewer bits allocated to other video channels. *Id.* When a video channel has less complex content, relatively fewer bits are allocated to that video channel, with more bits allocated to other video channels. *Id.* In this way, bits of an overall budget R are generally allocated to different video channels depending on video complexity.

The Ozkan patent describes refining allocations in various situations. For example, the Ozkan patent describes setting a minimum bit rate allocation for a channel: (a) to prevent quality from dropping "precipitously" (Ozkan patent, 9:27-29), (b) to account for the possible complexity of scene changes (Ozkan patent, 9:29-36), or (c) to match a minimum imposed by the operator of a transmission link (Ozkan patent, 10:34-37). As other examples, the Ozkan patent describes setting a maximum bit rate allocation for a channel: (d) to match a point at which "no improvement in the quality of the reproduced image is visible," or (e) to match a maximum imposed by the operator of a transmission link. Ozkan patent, 10:27-37.

The Ozkan patent describes further refining allocated bit rates to provide buffer management, for example, to ensure that input buffers of receiver decoders do not overflow or underflow. Ozkan patent, 10:54-11:57. The Ozkan patent indicates a decoder buffer size D is "fixed." Ozkan patent, 10:62. According to the Ozkan patent, if an encoder buffer size is capped, the bit rate allocation R^i for a video channel can vary between a minimum bit rate allocation R_{min} for the video channel and a maximum bit rate allocation R_{max} for the video channel without inducing underflow or overflow. Ozkan patent, 10:62-67. The Ozkan patent then describes how this constraint on encoder buffer size can be relaxed, loosening constraints on maximum and minimum bit rate allocations. Ozkan patent, 11:5-12:44.

III.   Claims 67-77, 79-97, 99-110, 112-116, 121, 122 and 124-132 Should Be Allowable.

In the Office action, the Examiner rejects claims 67-77, 79-97, 99-110, 112-116, 121, 122 and 124-132 under 35 U.S.C. § 103(a) as being unpatentable over the Ozkan patent in view of

the Hurst patent. The Applicants respectfully disagree with the rejections. The Ozkan patent and the Hurst patent, taken separately or in combination, fail to teach or suggest at least one element of each of claims 67-77, 79-97, 99-110, 112-116, 121, 122 and 124-132.

Each of claims 67, 92, 128 and 132, as amended, recites:

> receiving multiple sets of reference decoder parameters signaled for a given bit stream of encoded data for a given video clip, wherein each of the multiple sets comprises a rate parameter and a decoder buffer size parameter for a reference decoder model that specifies constraints on fluctuations of the given bit stream of encoded data for the given video clip, and wherein each of the multiple sets indicates a different and alternative combination of rate parameter and decoder buffer size parameter for the same video images in the given bit stream of encoded data for the given video clip.

Claim 108, as amended, recites:

> receiving a number parameter that indicates how many sets of reference decoder parameters are signaled for a given bit stream of encoded data for a given video clip;
> receiving multiple sets of reference decoder parameters signaled for the given bit stream of encoded data for the given video clip, wherein each of the multiple sets comprises a rate parameter and a decoder buffer size parameter for a reference decoder model that specifies constraints on fluctuations of the given bit stream of encoded data for the given video clip, and wherein each of the multiple sets represents a different and alternative point along a rate-decoder buffer size curve for the same video images in the given bit stream of encoded data for the given video clip.

Claim 121, as amended, recites:

> receiving a number parameter that indicates how many sets of reference decoder parameters are signaled for a given bit stream of encoded data for a given video clip;
> receiving multiple sets of reference decoder parameters signaled for the given bit stream of encoded data for the given video clip, wherein each of the multiple sets comprises a rate parameter and a decoder buffer size parameter for a reference decoder model that specifies constraints on fluctuations of the given bit stream of encoded data for the given video clip
> ... wherein each of the multiple sets represents a different and alternative point along a rate-decoder buffer size curve for the same video images in the given bit stream of encoded data for the given video clip.

The Ozkan patent fails to teach or suggest the above-cited language of claims 67, 92, 108, 121, 128 and 132, respectively.

The Examiner appears to map the "rate parameter" and "decoder buffer size parameter" language of claims 67, 92, 108, 121, 128 and 132 to rate allocation R and buffer size D. Office action, page 3. Even if this mapping were correct (and the Applicants believe it is not), the R and D values in the Ozkan patent are used within the encoder-side multiplexer system of Figure 1 of the Ozkan patent; they are not signaled for a bit stream of encoded data. Ozkan patent, 10:54-11:57. The Ozkan patent therefore leads away from "receiving multiple sets of reference decoder parameters *signaled*" for given video, as recited in claims 67, 92, 108, 121, 128 and 132, respectively. The Ozkan patent is even further from teaching or suggesting "receiving a number parameter that indicates how many sets of reference decoder parameters are signaled," as recited in claims 108 and 121, respectively.

The Ozkan patent describes a minimum bit rate allocation R_{min}, a maximum bit rate allocation R_{max} and a decoder buffer size D. Ozkan patent, 10:27-67. Even if, for the sake of argument, R_{min}, R_{max} and D were considered to be reference decoder parameters (and the Applicants believe they are not), R_{min}, R_{max} and D would constitute a single set of parameters for video in one channel. Using a single set of R_{min}, R_{max} and D parameters for a single video channel (as in the Ozkan patent) is different than, and leads away from, "multiple sets of reference decoder parameters" signaled as *different, alternative sets of parameters for the same video images*:

> "each of the multiple sets indicates a different and alternative combination of rate parameter and decoder buffer size parameter for the same video images in the given bit stream of encoded data for the given video clip" (claims 67, 92, 128 and 132); and

> "each of the multiple sets represents a different and alternative point along a rate-decoder buffer size curve for the same video images in the given bit stream of encoded data for the given video clip" (claims 108 and 121).

The Ozkan patent also describes changing a rate parameter R^i from GOP to GOP, or for other quota periods, for a video channel, such that R^i can vary between R_{min} and R_{max}. Ozkan patent, 9:10-36, 10:54-11:36. Even if, for the sake of argument, R^i were considered to be reference decoder parameter (and the Applicants believe it is not), the Ozkan patent describes changing R^i for different pictures between different quota periods. This leads directly away from "multiple sets of reference decoder parameters" signaled as different, alternative sets of

parameters for the same video images, and thus leads away from the above-cited language of claims 67, 92, 108, 121, 128 and 132, respectively.

Finally, the Ozkan patent describes multiple video channels, with each channel having its own set of R_{min}, R_{max} and D, and describes changing a rate parameter R^i from channel to channel (e.g., R^0 for channel 0, R^1 for channel 1, etc.) for a quota period. Even if, for the sake of argument, R^i, R_{min}, R_{max} and D were considered to be reference decoder parameters (and the Applicants believe they are not), changing a parameter from channel to channel (as in the Ozkan patent) again involves changing the parameter for different video pictures. This too leads away from "multiple sets of reference decoder parameters" signaled as different, alternative sets of parameters for the same video images, and thus leads away from the above-cited language of claims 67, 92, 108, 121, 128 and 132, respectively.

Combining the Hurst patent with the Ozkan patent fails to remedy this deficiency. The Hurst patent also fails to teach or suggest the above-cited language of claims 67, 92, 108, 121, 128 and 132, respectively. In the Hurst patent, different encoders use different video buffer verifier ("VBV") models for different bitstreams. Hurst patent, 4:17-29, 7:40-45. Using different VBV models for different bitstreams, with each encoder having its own VBV model for one bit stream (as in the Hurst patent), is different than, and leads away from, multiple sets of parameters signaled for a given "bit stream of encoded data for the given video clip" (as in claim 67, 92, 108, 121, 128 or 132). It is even further from teaching or suggesting different, alternative sets of parameters signaled for the same video images in a given bit stream of encoded data for a given video clip, and thus leads away from the above-cited language of claims 67, 92, 108, 121, 128 and 132, respectively.

More generally, the Examiner has combined the VBV features of the Hurst patent with rate control mechanisms of the Ozkan patent. Even if, for the sake of argument, VBV model parameters of the Hurst patent qualify as reference decoder parameters, simply incorporating them into the Ozkan patent would not result in any change to what is signaled according to the Ozkan patent. The rate control mechanisms of the Ozkan patent would still adjust rate allocations within the minimum or maximum rates allowed for a given channel, still considering the minimum rate R_{min}, maximum rate R_{max} and decoder buffer size D already described in the Ozkan patent. The combination proposed by the Examiner would still lack "multiple sets of reference decoder parameters" signaled as *different, alternative sets of parameters for the same*

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video images, and thus would still lack the above-cited language of claims 67, 92, 108, 121, 128 and 132, respectively.

Claims 67, 92, 108, 121, 128 or 132 should be allowable. Each of dependent claims 68-77, 79-91, 93-97, 99-107, 109, 110, 112-116, 122, 124-127 and 129-131 depends directly or indirectly from, and includes the language of, claim 67, 92, 108, 121, 128 or 132, and should also be allowable. The Applicants will not belabor the merits of the separate patentability of these dependent claims.

IV. Claims 117-120 Should Be Allowable.

In the Office action, the Examiner rejects claims 117-120 under 35 U.S.C. § 103(a) as being unpatentable over the Ozkan patent in view of the Hurst patent and U.S. Patent No. 5,541,852 to Eyuboglu et al. ("Eyuboglu patent"). The Applicants respectfully disagree.

As explaining in the previous section, the Ozkan patent and the Hurst patent, taken separately or in combination, fail to teach or suggest "multiple sets of reference decoder parameters signaled for a given bit stream of encoded data for a given video clip" or "each of the multiple sets indicates a different and alternative combination of rate parameter and decoder buffer size parameter for the same video images in the given bit stream of encoded data for the given video clip," as recited in claim 117.

Combining the Eyuboglu patent with the Ozkan patent and the Hurst patent fails to remedy this deficiency. The Eyuboglu patent describes transcoding a constant bit rate video bit stream to a variable bit rate video bit stream and packetizing the variable bit rate video bit stream into packets for transport over a packet-switched network. Eyuboglu patent, Abstract. The Eyuboglu patent does not teach or suggest the above-cited language of claim 117. Thus, taken separately or in combination, the Ozkan patent, the Hurst patent and the Eyuboglu patent fail to teach or suggest the above-cited language of claim 117.

Claim 117-120 should be allowable. The Applicants will not belabor the merits of the separate patentability of dependent claims 118-120.

V. Claims 78, 98, 111 and 123 Should Be Allowable.

In the Office action, the Examiner rejects claims 78, 98, 111 and 123 under 35 U.S.C. § 103(a) as being unpatentable over the Ozkan patent in view of the Hurst patent and U.S. Patent No. 6,873,629 to Morris et al. ("Morris patent"). The Applicants respectfully disagree.

Taken separately or in combination, the Ozkan patent, the Hurst patent and the Morris patent fail to teach or suggest the above-cited language of claims 67, 92, 108 and 121, respectively. Each of claims 78, 98, 111 and 123 depends directly or indirectly from, and includes the language of, independent claim 67, 92, 108 or 121. As explained above, the Ozkan patent and the Hurst patent do not teach or suggest the above-cited language of claims 67, 92, 108 and 121, respectively. Combining the Morris patent with the Ozkan patent and the Hurst patent fails to remedy this deficiency. The Morris patent describes conversion of input data streams in MPEG-2 Transport Stream format into output data streams in MPEG-2 Program Stream format (Morris patent, Abstract), but also does not teach or suggest the above-cited language of claims 67, 92, 108 and 121, respectively.

For at least these reasons, claims 78, 98, 111 and 123 should be allowable. The Applicants will not belabor the merits of the separate patentability of these dependent claims.

VI. Conclusion.

Claims 67-132 should be allowable. Such action is respectfully requested. The Examiner is invited to call the undersigned attorney at the telephone number below if the Examiner believes that doing so would further the prosecution of the present application.

Respectfully submitted,

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